UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/464,830	12/17/1999	KARL J. MOLNAR	8194-350	8144

20792	7590	08/10/2004

MYERS BIGEL SIBLEY & SAJOVEC
PO BOX 37428
RALEIGH, NC 27627

EXAMINER
AHN, SAM K

ART UNIT	PAPER NUMBER
2637	

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
	09/464,830	MOLNAR, KARL J.
Office Action Summary	Examiner	Art Unit
	Sam K. Ahn	2637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 June 2004</u>.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-36</u> is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>7-18 and 25-36</u> is/are allowed.

6)☒ Claim(s) <u>1-3 and 19-21</u> is/are rejected.

7)☒ Claim(s) <u>4-6 and 22-24</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All   b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 6/2/04 have been fully considered but they are not persuasive. Applicants argue that combination of Cui and Chen do not teach the definition of a joint demodulator. Cui discloses a method and apparatus of a receiver comprising SA-CCIC (Single Antenna – Co-channel Interference Cancellation) demodulator and a conventional demodulator. Cui discloses detailed teaching of SA-CCIC in figure 5. The received signal, R(n) including interfering signals enter the SA-CCIC. (120 in Fig.5) The outputs of decision device (512) are Si and Sd, interfering signal and desired signal, respectively. (note col.7, line 45 – col.9, line 55) These outputs are fed-back to determine a better estimation of a desired signal. (note col.9, line 56 – col.14, line 6) Cui further teaches SINR detector that measures signal to interference and noise ratio. Cui teaches demodulating the signal when a relationship between the signal and the noise and the interference meets a criterion, and jointly demodulating the signal when a relationship between the signal and the noise and the interference does not meet a criterion. (note col.14, lines 7-18) Joint demodulation can be defined, as stated in the specification (note 26th line on page 1 – 4th line on page 2) as a demodulator comprising more complex operation than a conventional demodulator, and detecting desired signal from a received signal that includes an interfering signal.

Although Cui also teaches the receiver canceling co-channel interference, Cui does not explicitly teach a joint demodulator meeting the definition wherein the receiver is

a joint demodulator demodulating both the desired signal and interfering signal, but rather demodulates only the desired signal.

Chen teaches a receiver comprising a joint channel estimator (12 in Fig.1) and a Joint Vector Viterbi Algorithm or a Viterbi Decoder (20) to cancel co-channel interference where both the desired signal and the interference signal are channel estimated and both are demodulated, and further decode the received signal. (note col.3, lines 30-49, note col.5, lines 1-15 and col.6, lines 26-50) And although Cui's SA-CCIC also teaches a receiver canceling interference, it would have been obvious to one skilled in the art at the time of the invention to demodulate both the desired signal and the interference signal in Cui's SA-CCIC demodulator coupled to Chen's Viterbi decoder (20) in Cui's decoder (122 in Fig.1) for the purpose of receiving signals with a low bit error rates by implementing a Fobenius norm, which takes the difference between the received signal and the actual received signal resulting in minimizing the node metric in the Viterbi algorithm, as taught by Chen. (note col.7, lines 7-18)

Furthermore, applicants argue that Cui in view of Chen do not teach where noise and interference meets or does not meet a second criterion. As explained above, Cui already teaches demodulating the signal when a relationship between the signal and the noise and the interference (which also includes the relationship between the noise and the interference) meets a criterion, and jointly demodulating the signal when a relationship between the signal and the noise and the interference does not

meet a criterion. (note col.14, lines 7-18)   The claim may be interpreted as wherein

the first criterion and the second criterion are equivalent. Therefore, Cui teaches this

limitation.

Specification

2. The abstract of the disclosure is objected to because it exceeds 150 words.

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Cui (previously cited) in view of Chen et al. (Chen).

Regarding claims 1 and 19, Cui discloses a method and apparatus of a

receiver comprising SA-CCIC (Single Antenna – Co-channel Interference

Cancellation) demodulator and a conventional demodulator. Cui discloses

detailed teaching of SA-CCIC in figure 5. The received signal, R(n) including

interfering signals enter the SA-CCIC. (120 in Fig.5) The outputs of decision

device (512) are Si and Sd, interfering signal and desired signal, respectively.

(note col.7, line 45 – col.9, line 55) These outputs are fed-back to determine a

better estimation of a desired signal. (note col.9, line 56 – col.14, line 6) Cui

further teaches SINR detector that measures signal to interference and noise

ratio. Cui teaches demodulating the signal when a relationship between the

signal and the noise and the interference meets a criterion, and jointly

demodulating the signal when a relationship between the signal and the noise

and the interference does not meet a criterion. (note col.14, lines 7-18)   Joint

demodulation can be defined, as stated in the specification (note 26th line on

page 1 – 4th line on page 2) as a demodulator comprising more complex

operation than a conventional demodulator, and detecting desired signal from a

received signal that includes an interfering signal. Cui teaches SA-CCIC

demodulator with equal function as of the joint demodulator.

Although Cui also teaches the receiver canceling co-channel interference, Cui

does not explicitly teach a joint demodulator meeting the definition wherein the

receiver is a joint demodulator demodulating both the desired signal and

interfering signal, but rather demodulates only the desired signal.

Chen teaches a receiver comprising a joint channel estimator (12 in Fig.1) and a

Joint Vector Viterbi Algorithm or a Viterbi Decoder (20) to cancel co-channel

interference where both the desired signal and the interference signal are

channel estimated and both are demodulated, and further decode the received

signal. (note col.3, lines 30-49, note col.5, lines 1-15 and col.6, lines 26-50) And

although Cui's SA-CCIC also teaches a receiver canceling interference, it would

have been obvious to one skilled in the art at the time of the invention to

demodulate both the desired signal and the interference signal in Cui's SA-CCIC

demodulator coupled to Chen's Viterbi decoder (20) in Cui's decoder (122 in

Fig.1) for the purpose of receiving signals with a low bit error rates by

implementing a Fobenius norm, which takes the difference between the received

signal and the actual received signal resulting in minimizing the node metric in

the Viterbi algorithm, as taught by Chen. (note col.7, lines 7-18)

Regarding claims 2 and 20, Cui in view of Chen teach all subject matter as

applied to claims 1 and 19. One skilled in the art may consider the criterion to be

a first criterion or a second criterion, wherein the first and second criterion may

be the same criterion. In regards to the limitation of the demodulator and the

joint demodulator responding to a relationship between the noise and the

interference meeting or not meeting a criterion, Cui, as explained above, teaches

signal to noise and interference relationship. And therefore, one skilled in the art

may analyze that the interference, which is extracted from the signal, uses the

same criterion, which includes the relationship between the noise and the

interference. (note col.14, lines 7-18)

Regarding claims 3 and 21, Cui in view of Chen teach all subject matter as

applied to claims 1 and 19. In demodulating the signal received, Cui further

teaches a threshold SINR value of 6 dB to determine whether conventional

demodulation or SA-CCIC demodulation is used. (note col.14, lines 7-18) When

SINR value is greater than 6 dB, conventional demodulation is used, while SA-

CCIC demodulation is used when less.

Allowable Subject Matter

4. Claims 4-6 and 22-24 are objected to as being dependent upon a rejected base

    claim, but would be allowable if rewritten in independent form including all of the

    limitations of the base claim and any intervening claims.

5. Claims 7-18 and 25-36 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter:

    Present application discloses a receiver comprising a demodulator and a joint

    demodulator, and selecting one of the demodulators depending on the level of signal

    to noise and interference ratio. Closest prior art, Cui teaches, in the same field of

    endeavor, selecting one of the demodulator depending on a threshold, however, Cui

    does not teach jointly demodulating the signal if the interference to noise ratio

    exceeds the second threshold. Furthermore, prior art does not teach finding the

    sequence of interference signal from the signal received based on the criterion.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

    policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Sam Ahn** whose telephone number is **(703) 305-0754**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Jay Patel**, can be reached at **(703) 308-7728**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
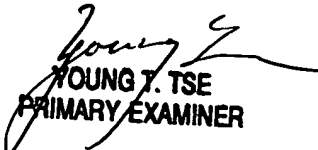
P.O. Box 1450

Alexandria, VA 22313-1450

or faxed to:

(703) 872-9306

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Sam K. Ahn
8/7/04

YOUNG T. TSE
PRIMARY EXAMINER